

# Application of high-resolution global simulations of tides embedded within an eddying general circulation model to SWOT mission planning

Brian K. Arbic, U-Michigan

James G. Richman, Naval Research Laboratory

Jay F. Shriver, Naval Research Laboratory

ALSO: Anna Savage, U-Michigan

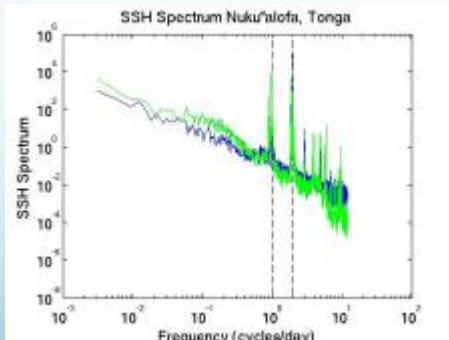
## BIG PICTURE OF PROPOSED RESEARCH:

- Tides both signals and noise in altimeter data
- High horizontal resolution of SWOT → internal tides more prominent
  - Tidal corrections hampered by aliasing problems
- New simulations of global eddying HYCOM with embedded tides → potential ocean simulator for SWOT (investigate aliasing)

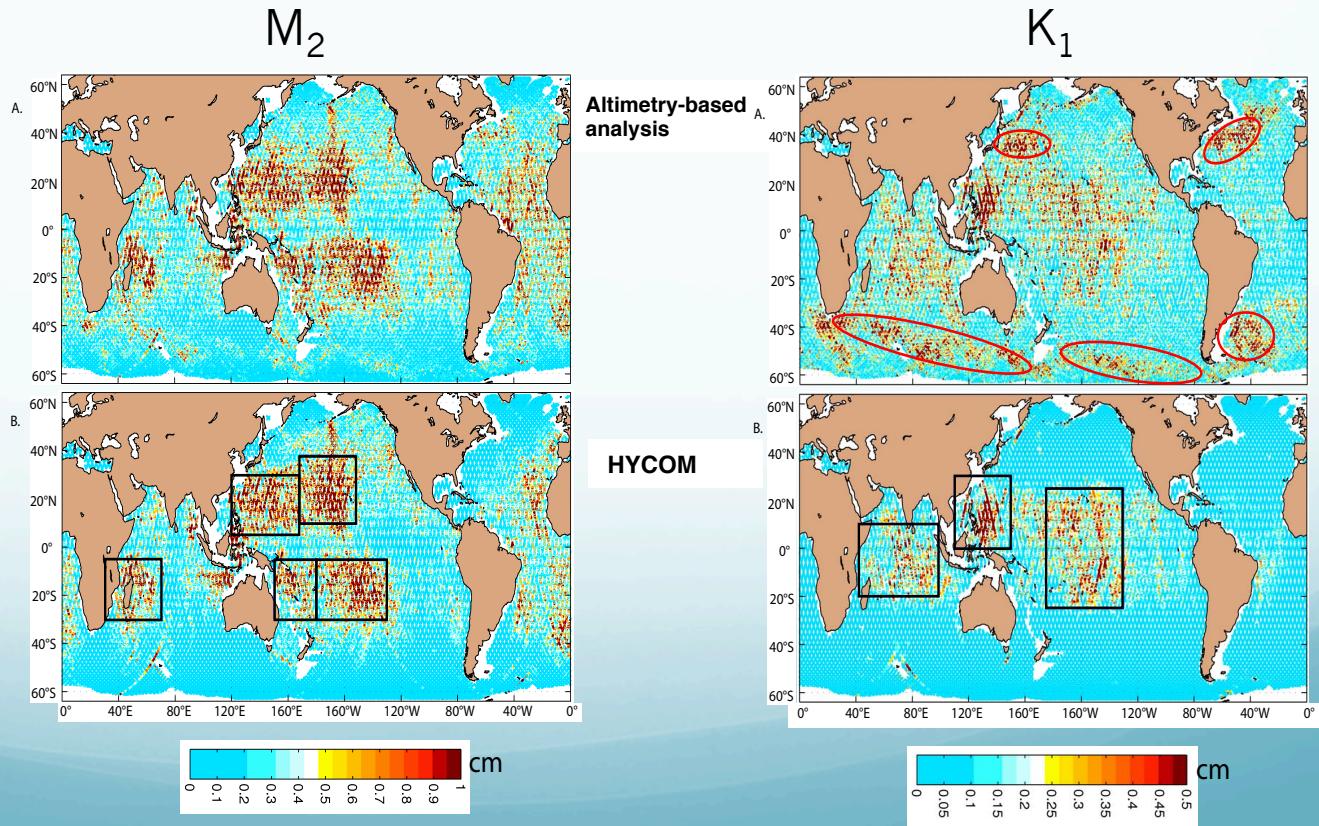
# Specific objectives and approach

**Utilize simulations of internal tides embedded within high-resolution HYCOM simulations to understand tidal aliasing problems for SWOT.**

Sea surface height frequency spectra in model (green) vs. tide gauge (blue)  
(Courtesy Anna Savage)



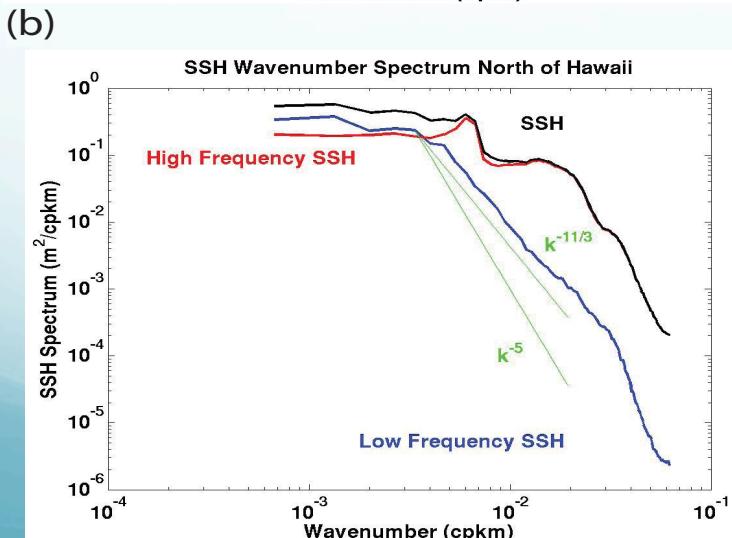
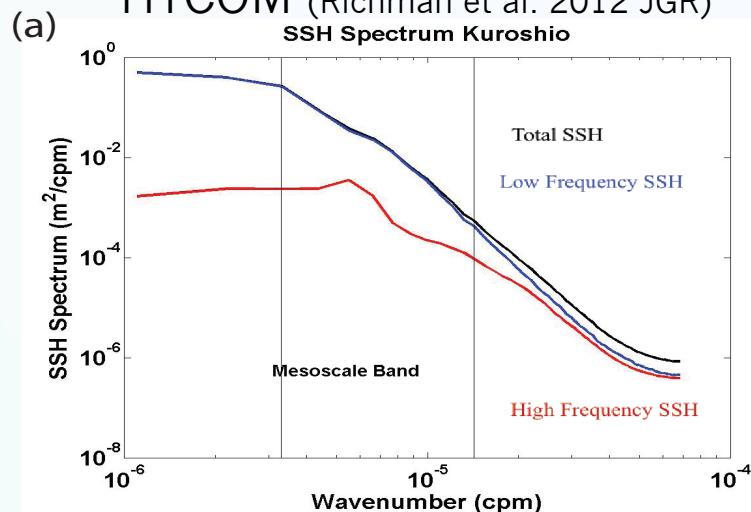
Model vs. altimeter maps of internal tide amplitudes at sea surface (Shriver et al. 2012 JGR)



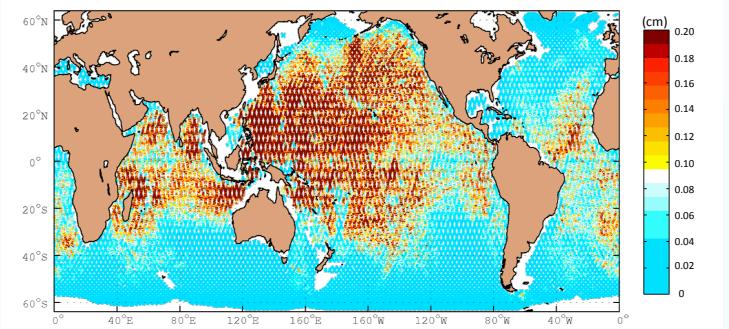
# How do internal tides affect the small scale ocean topography?

Low- vs high-frequency wavenumber spectra in

HYCOM (Richman et al. 2012 JGR)  
SSH Spectrum Kuroshio



$M_2$  internal tide non-stationarity in HYCOM  
(Shriver et al. in prep)



New directions for model in next few years

- Data assimilation of tides
- Doubling resolution to  $1/25^\circ$
- Improvements to barotropic and internal tides
- 3-D tidal boundary conditions for higher resolution